extract. It is here that the author finds a function for catalase. The extract is rich in catalase, and since no other function for this enzyme is known, he makes it the active agent in the first step of fermentation according to the scheme. Nor is this view reached without apparent experimental evidence. Extracts of yeast rich in catalase were allowed to act for various lengths of time on 10 per cent glucose solutions. The solutions were found to contain lactic acid, which was identified by its zinc and calcium salts and by other tests. Unfortunately the experiments are not entirely convincing, since the only precaution to insure sterility was the addition of thymol to the flasks. It is not recorded that cultures were made from the flasks at the end of the experiments to demonstrate their sterility. The finding of oxalic acid in the flasks would seem to add to the doubtfulness of the experiments.

KUSSEROW,[8] believing that no description of the mechanism of fermentation has been given, propounds a new theory of alcoholic fermentation. This theory is that the demand of the yeast cell for oxygen results in the reduction of glucose to sorbite, a molecule of water being involved in the reaction. The sorbite breaks up directly into alcohol, carbon dioxid, and hydrogen. The hydrogen reduces a further molecule of glucose, and so the process goes on. The view is scarcely supported by evidence, nor would the dearth of theories alone seem to warrant it, for several have been proposed.—H. HASSELBRING.

Vegetative reproduction in Metzgeria.—EVANS[9] has described the gemmae of 12 species of *Metzgeria*. They fall into three groups, depending upon their position on the thallus. The first group (5 spp.) has the gemmae marginal; the second (6 spp.) has them on the antical surface of the wings; and in the third group (1 sp.) they are indefinite in position. When a gemma is to be produced, a marginal cell projects beyond its neighbors and its outer wall is ruptured. The protruding protoplast is not naked, however, but is covered by a thick layer of transparent gelatinous substance, which EVANS thinks is a modification of the inner portion of the original wall. Upon the inner surface of this gelatinous substance a very thin new wall soon appears. The projecting cell divides by a periclinal wall; the outer of these two cells is considered to be the mother cell of the gemma. A second wall meets the first, obliquely cutting off a wedge-shaped apical cell, which proceeds to cut off segments right and left. The original gelatinous substance becomes stretched by the growth of the gemma until it finally disappears. The gemma is separated from the plant by the splitting of the original periclinal wall. Along the margin of the young gemma hooked hairs appear. As it becomes older, new hairs appear, which function as rhizoids. The young gemma shows no sign of dorsiventrality.

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[8] KUSSEROW, R., Centralbl. Bakt. II. **26**:184–187. 1910.

[9] EVANS, ALEXANDER W., Vegetative reproduction in *Metzgeria*. Annals of Botany **24**:272–303. *figs. 16*. 1910.

EVANS thinks that a vigorous apical cell exercises an inhibitory action on the production of gemmae, and that when the apical cell is suppressed, or its activity lessened, gemmae are able to form. He says:

Just why the normal activities of the apical region are lessened in these cases and finally brought to an end, is by no means clear. In some instances the result is perhaps due to poor nutrition, bringing about an enfeeblement of the whole plant; but this cannot be the effective cause in all cases, because a limitation of growth often takes place in plants which are robust. Under these circumstances the plant is probably able to control the apical growth, perhaps by diverting the currents of food to other regions. Apparently something of the same sort takes place in such species as *M. dichotoma*, where the growth of the gemmiparous branch continues for an indefinite period. The power of the plant to regulate the distribution of the nutritive materials, and thus to weaken or destroy the inhibitory influence exerted by the apical region upon the cells capable of producing gemmae, may be considered a specific character.

It seems possible that the production of gemmae may rather be due to the influence of some external factor than to an internal self-regulating mechanism; and it is possible by experiment to determine what this factor may be.—W. J. G. LAND.

Presentation time.—RUTGERS,[10] working in WENT's laboratory at Utrecht, has studied the relation of temperature to geotropic presentation time in the etiolated seedlings of *Avena*. He believes that VAN'T HOFF's law of speed of reaction for temperature holds from 5° to 30° C. with a coefficient of about 2.6 for every rise of 10°. From 0° to 10° the coefficient is 6.8. RUTGERS attributes this high coefficient to the effect of low temperature on growth. From 25° to 35° the coefficient is 0.93, and for higher temperatures still lower. The time of previous warming (varying 1 to 24 hours) has no effect up to 25°; but at 30° its effect is marked. At the latter temperature one hour's warming gives a presentation time of 3.5 min.; while 12 to 24 hours gives 1.66 minutes. These results do not agree with those of BACH.[11] It is certainly interesting, if true, that this chemical law applies to this supposedly complex process of perception as BLACKMAN[12] has shown it to apply in photosynthesis, and KUYPER[13] in respiration, and various other workers in other processes.

Serious criticism can be offered against RUTGERS' methods and his discussion of literature. So far as his description of methods tells, he seems to

[10] RUTGERS, A. A. L., The influence of temperature on the presentation time in geotropism. English reprint from the Proc. Konink. Akad. Wetensch. Amsterdam. Oct. 29, 1910.

[11] Bach, H., Ueber die Abhängigkeit der geotropischen Präsentation und Reaktionzeit von verschiedenen Aussenbedingungen. Jahrb. Wiss. Bot. **44**:57–123. 1907.

[12] BLACKMAN, F. F., Optima and limiting factors. Annals of Botany **19**:281–295. 1905.

[13] BOT. GAZETTE **50**:233–234. 1910.